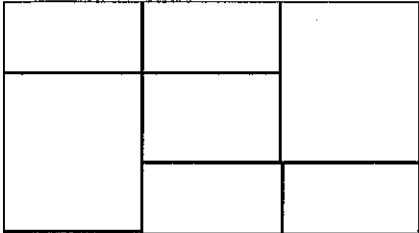


Test of Genius

1. How many **rectangles** can you find in this figure?



2. Mr. Brown, Mr. Green and Mr. Black were having lunch together. One of them was wearing a brown tie, one a black tie and the other a green tie. Suddenly the man wearing the green tie noticed something. He said, "I just realized that we are wearing ties that match our names, but no one is wearing a tie to match his own name."
"How interesting!" exclaimed Mr. Black. What color tie was each man wearing?

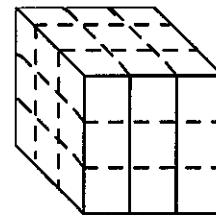
3. The four stamps below can be attached to each other in various ways. One way is shown here. In how many other ways could the 4 stamps be attached?



4. As a prize, a contest winner is to draw one bill at a time from a box containing ten \$5 bills, ten \$10 bills, and ten \$20 bills. The drawing ends when 3 bills of the same denomination are drawn. What is the largest sum of money that can be won under these conditions?

6. What is the greatest number of coins that you can have (in pennies, nickels, dimes, quarters, and half-dollars), if you have to have at least one of each type of coin, and you would still not be able to give change for a dollar?

7. The figure below represents a cube that measures 3 cm on each edge. Suppose the entire cube is painted green, and is then cut up into 27 smaller cubes that are each 1 cm on each edge. How many of the 27 smaller cubes would have 3 green sides? How many would have 2 green sides? How many would have 1 green side? How many would have no green sides?



8. It takes $4\frac{1}{2}$ hours for a jet to fly from coast to coast. One jet leaves Los Angeles for New York at 4:40 p.m., while another jet leaves New York for Los Angeles at 6:00 p.m. Which plane will be closer to New York when they pass each other?

SCORING GUIDE

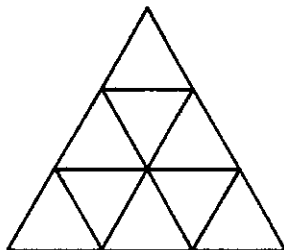
7 or 8	—	Megastar Genius
5 or 6	—	Star Genius
3 or 4	—	Genius
2 or less	—	Genius in Waiting

5. What is the next figure in this series?



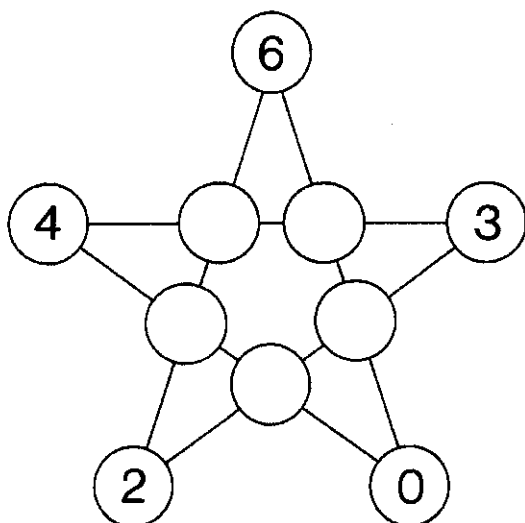
☆ Test of Genius ☆

- ① How many triangles can you count in this figure?



- ② One hundred automobiles were lined up bumper-to-bumper. How many bumpers were actually touching each other?

- ③ Fill in the circles with the numbers 1, 2, 3, 4, and 5 so that no matter which line is added, the sum of the four numbers will be 12.



- ④ A baseball team played 150 games. It won 30 more games than it lost. How many games did the team lose?

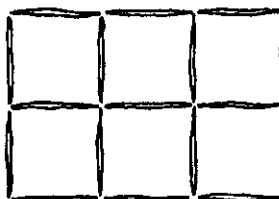
- ⑤ A pogo stick cost \$30. A scooter cost \$40 more than the pogo stick. A bicycle cost \$50 more than the scooter. What was the total cost of all three?

- ⑥ In the following subtraction problem, the letters A, B, and C stand for three different digits. What digit should replace each letter?

$$\begin{array}{r} \text{A B A} \\ - \text{C A} \\ \hline \text{A B} \end{array}$$

- ⑦ Four trees lived in a row in Happy Forest. They were red, green, yellow, and blue. The red tree was not next to the green tree. The blue tree was to the right of the green tree. The yellow tree was first. In what order were the trees lined up?

- ⑧ The toothpicks in the drawing have been arranged to form six squares. Which five toothpicks can be removed to leave only three squares?



- ⑨ You have 10 dollars. If you give away all but 3 dollars, how many dollars do you have left?

SCORING KEY

8 or 9 — *Superstar Genius*
 6 or 7 — *Star Genius*
 4 or 5 — *Genius*
 3 or less — *Genius of the Future*

Name _____

Block _____

Date _____

Mathematics 1

1. What is the value of $3 + (-3)$? What is the value of $(-10.4) + 10.4$? These pairs of numbers are called *opposites*. What is the sum of a number and its opposite? Does every number have an opposite? State the opposite of:

- (a) -2.341 (b) $1/3$ (c) x (d) $x + 2$ (e) $x - 2$

2. As shown on the number line below, k represents an unknown number between 2 and 3. Plot each of the following, extending the line if necessary:

- (a) $k + 3$ (b) $k - 2$ (c) $-k$ (d) $6 - k$



3. You are already familiar with operations involving positive numbers, but much mathematical work deals with negative numbers. Common uses include temperatures, money, and games. It is important to understand how these numbers behave in arithmetic calculations. First, consider addition and subtraction. For each of the following, show how the answer can be visualized using a number-line diagram:

(a) The air temperature at 2 pm was 12° . What was the air temperature at 8 pm, if it had dropped 15° by then?

(b) Telescope Peak in the Panamint Mountain Range, which borders Death Valley, is 11045 feet above sea level. At its lowest point, Death Valley is 282 feet below sea level. What is the vertical distance from the bottom of Death Valley to the top of Telescope Peak?

(c) In a recent game, I had a score of 3. I then proceeded to lose 5 points and 7 points on my next two turns. On the turn after that, however, I gained 8 points. What was my score at this moment in the game?

4. To buy a ticket for a weekly state lottery, a person selects 6 integers from 1 to 36, the order not being important. There are 1947792 such combinations of six digits. Alex and nine friends want to win the lottery by buying every possible ticket (all 1947792 combinations), and plan to spend 16 hours a day doing it. Assume that each person buys one ticket every five seconds. What do you think of this plan? Can the project be completed within a week?

5. Locate the following numbers relative to each other on a number line:

- (a) 3.03 (b) 3.303 (c) 3.033 (d) 3.333 (e) 3.33

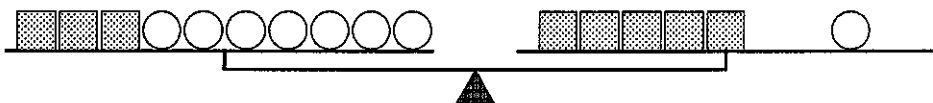
6. The area of the surface of a sphere is described by the formula $S = 4\pi r^2$, where r is the radius of the sphere. The Earth has a radius of 3960 miles and dry land forms approximately 29.2% of the Earth's surface. What is the area of the dry land on Earth? What is the surface area of the Earth's water?

7. Mark a random number x between 1 and 2 (at a spot that only you will think of) on a number line. Plot the *opposite* of each of the following:

- (a) x (b) $x + 5$ (c) $x - 4$ (d) $6 - x$

Mathematics 1

1. Use the *balance diagram* below to find how many marbles it takes to balance one cube.



2. (Continuation) Using c to stand for the weight of one cube and m for the weight of one marble, write an equation that models the picture in the previous problem. Use this equation to find how many marbles it takes to balance one cube.

3. The division problem $12 \div \frac{3}{4}$ is equivalent to the multiplication problem $12 \cdot \frac{4}{3}$. Write each of the following division problems as equivalent multiplication problems:

(a) $20 \div 5$ (b) $20 \div \frac{1}{5}$ (c) $20 \div \frac{2}{5}$ (d) $a \div \frac{b}{c}$ (e) $\frac{b}{c} \div a$

4. What is the value of $\frac{2}{3} \cdot \frac{3}{2}$? What is the value of $4 \cdot \frac{1}{4}$? These pairs of numbers are called *reciprocals*. What is the product of a number and its reciprocal? Does every number have a reciprocal? State the reciprocal of the following:

(a) $\frac{5}{3}$ (b) $-\frac{1}{2}$ (c) 2000 (d) $\frac{a}{b}$ (e) x

5. Here is another number puzzle: Pick a number, add 5 and multiply the result by 4. Add another 5 and multiply the result by 4 again. Subtract 100 from your result and divide your answer by 8. How does your answer compare to the original number? You may need to do a couple of examples like this until you see the pattern. Use a variable for the chosen number and show how the pattern holds for any number.

6. (Continuation) Make up a number puzzle of your own. Be able to verify the pattern using a variable for the number chosen initially.

7. Jess takes a board that is 50 inches long and cuts it into two pieces, one of which is 16 inches longer than the other. How long is each piece?

8. Consider the sequence of numbers 2, 5, 8, 11, 14, ..., in which each number is three more than its predecessor.

- (a) Find the next three numbers in the sequence.
(b) Find the 100th number in the sequence.
(c) Using the variable n to represent the position of a number in the sequence, write an expression that allows you to calculate the n^{th} number. The 200th number in the sequence is 599. Verify that your expression works by evaluating it with n equal to 200.

9. A group of ten persons were planning to contribute equal amounts of money to buy some pizza. After the pizza was ordered, one person left. Each of the other nine persons had to pay 60 cents extra as a result. How much was the total bill?